Water Demand & Supply Projections

Long Term Water Augmentation Committee Meeting
March 3, 2017

Pam Muse

Planning & Data Management

Arizona Department of Water Resources

PROJECTIONS

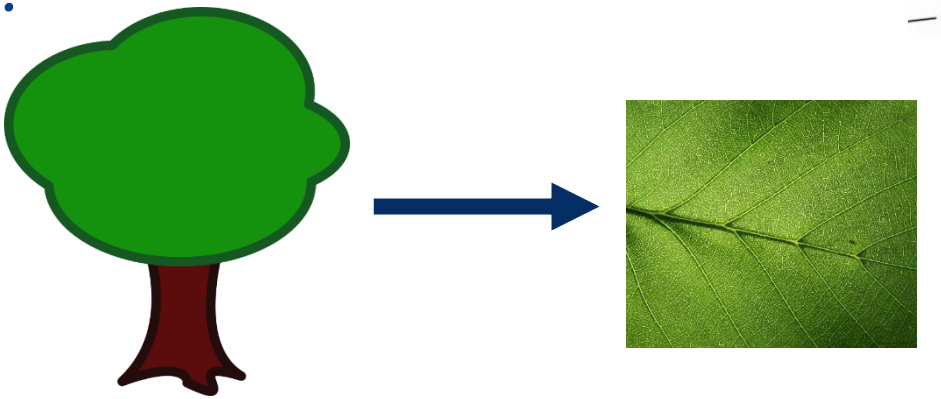
- Projections aren't predictions
- Tool to help plan; to explore; what IF…
- Only as useful as the data/assumptions that go into them
- Ranges are good, but…
- Reality usually falls somewhere in between

"STRAIGHT FACE" TEST

REASONABLENESS

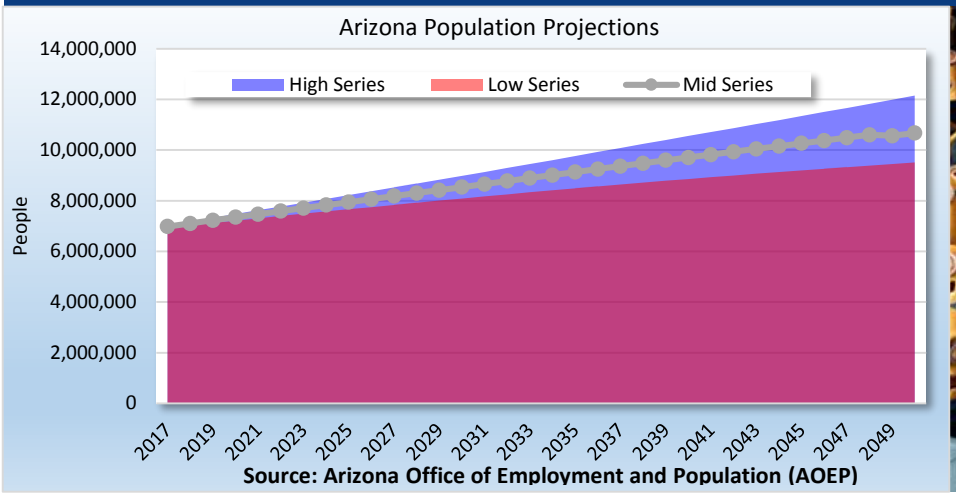
PROJECTIONS

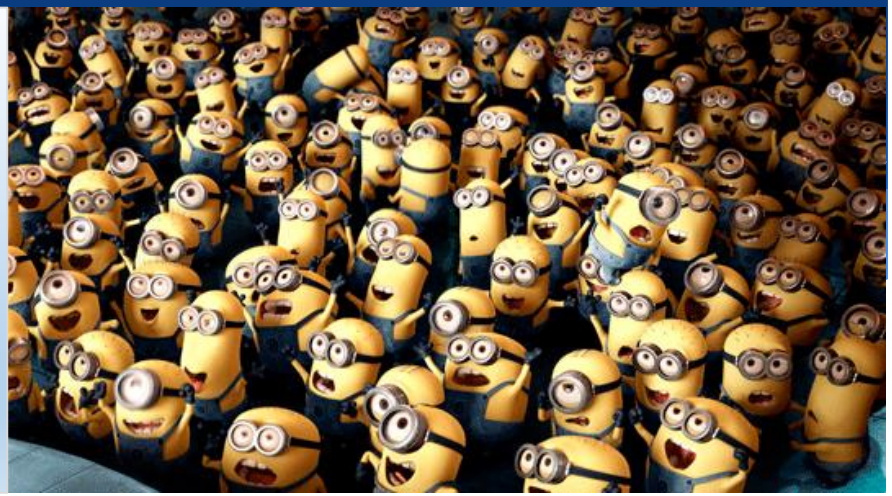
- Relationships are key
- Research
- Always another component you can add;
  - How coarse/detailed?
  - Purpose?



“The future ain’t what it used to be.” Yogi Berra

EVERYTHING STARTS WITH POPULATION

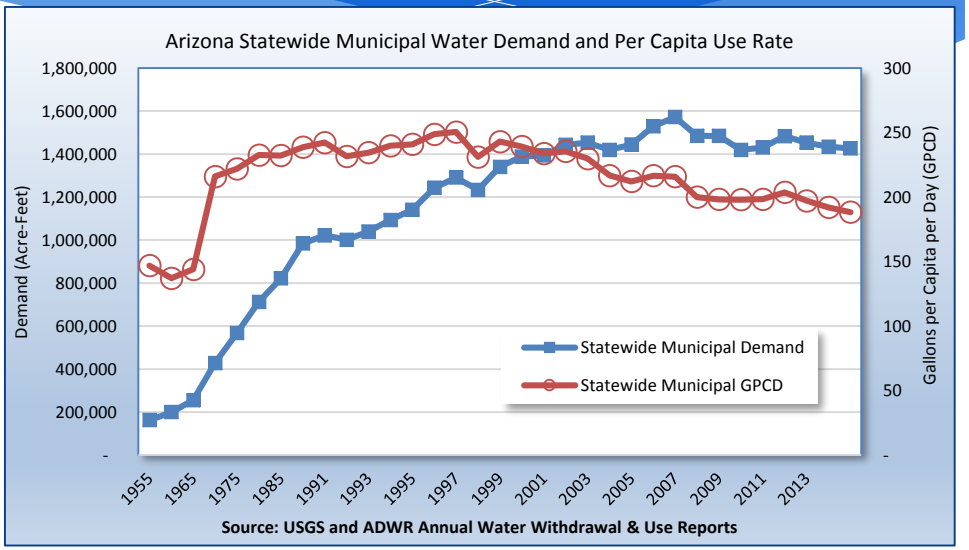




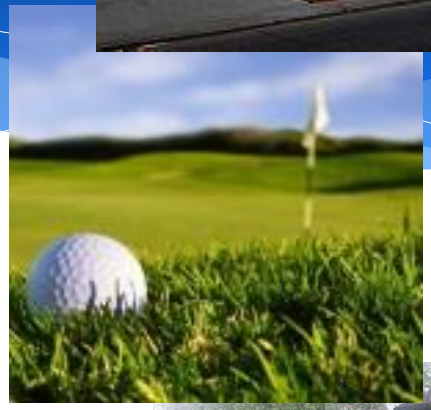
- ADWR re-aggregated AOEP population projections to water planning area boundary
- Projections released 2013 & 2015
  - 2013 projections generally higher than 2015's
- ADWR has a low, mid & high projection for each planning area, basin & place in AZ

MUNICIPAL DEMAND - GPCD Pitfalls

- **Current use rates will not persist**
  - New plumbing fixtures use less than those replaced
  - EPA "WaterSense" plumbing fixtures in new construction
  - Water conservation ethic?
  - Landscaping in new subdivisions?
  - Existing landscape conversion to Xeriscape?

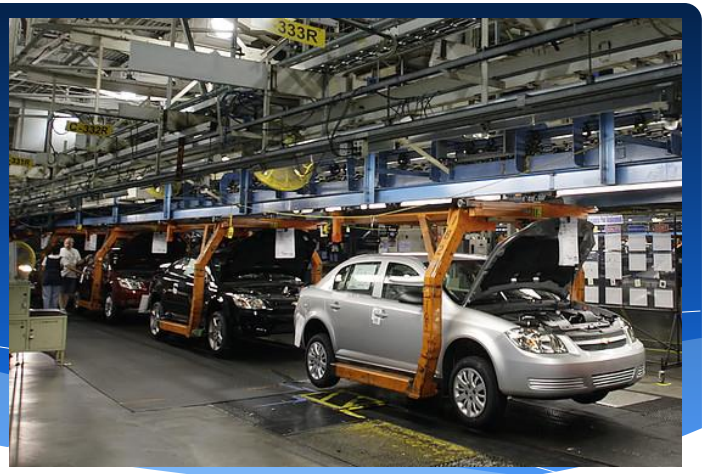


MUNICIPAL DEMAND - GPCD Pitfalls



- **What kind of a water provider are you?**
  - Mobile Home Park
  - Seasonal population
  - Lots of parks, golf courses?
  - Older community, not growing
  - Brand new homes, granite yards, new fixtures
  - Swimming pools?

MUNICIPAL DEMAND - GPCD Pitfalls



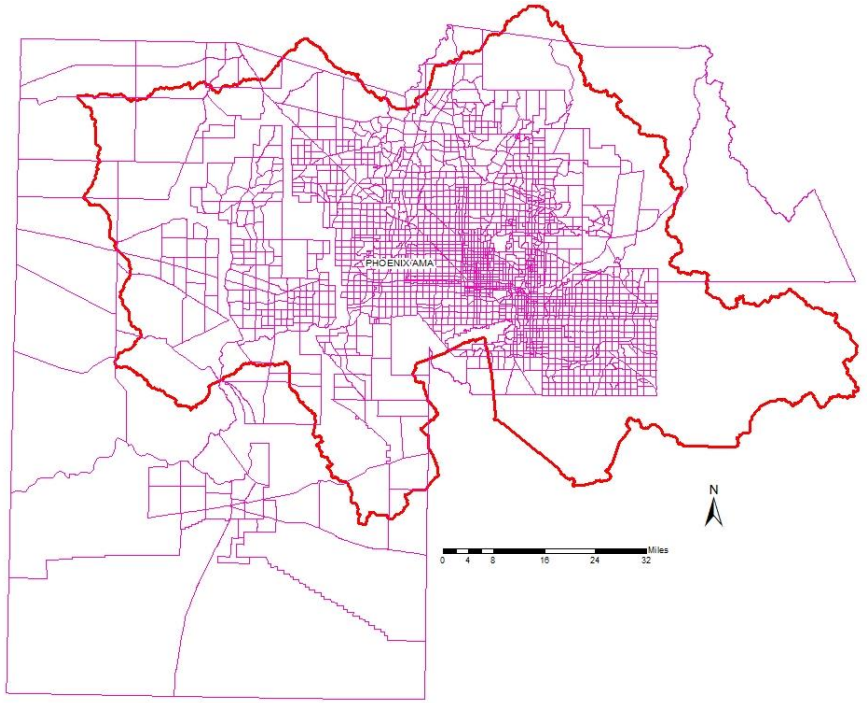
- **The non-residential component**
  - No non-res/commercial now, but will add some – GPCD goes **up**
  - Have some non-res, but all commercial zoned land is built out – all future growth will be residential – GPCD goes **down**

MUNICIPAL DEMAND - GPCD Pitfalls

- **Water loss**
  - Component of water production – it comes out of the aquifer/river
  - Does your system have a high rate of water loss? Is that likely to continue?
- **What about private well uses?**

4MP GENERAL ASSUMPTIONS

- **MUNICIPAL ASSUMPTIONS:**
  - Traffic Analysis Zone (TAZ) projections
    - Disaggregated (individual providers, exempt wells)
  - Large provider individual projections
    - Water supply use history
    - Designation pledged supplies
    - Other information
  - Supply priority for each provider



4MP GENERAL ASSUMPTIONS

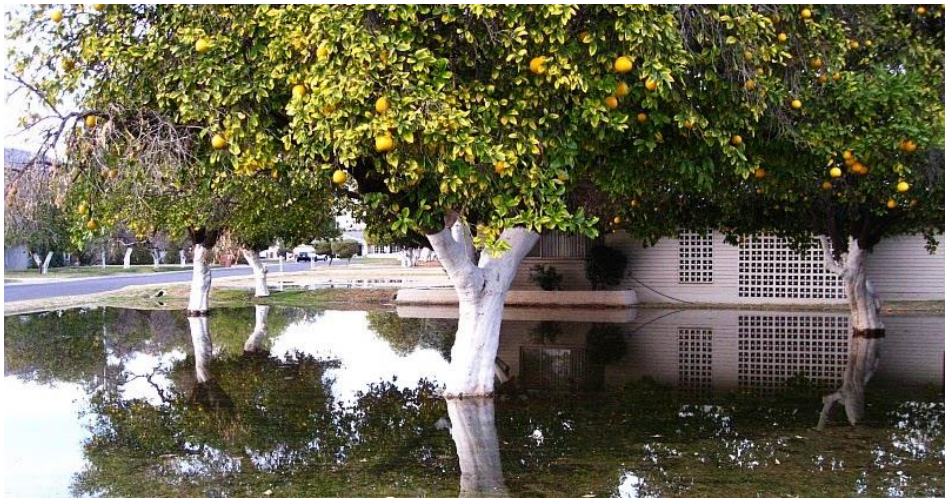
- **SMALL MUNICIPAL PROVIDER ASSUMPTIONS**
  - Differed by AMA
  - Generally trend lines, unless other information available (AWS determinations)
  - Historical supply portfolio (mostly groundwater), unless other information available (wwtps, recharge permits)

4MP GENERAL ASSUMPTIONS

- **EXEMPT WELL DEMAND ASSUMPTIONS**
  - Differed by AMA
  - Projected population = remainder of AMA population minus providers
  - Used models for new SF homes
    - EPA "WaterSense" fixtures
    - Updated landscape assumptions

4MP GENERAL ASSUMPTIONS

- **UNTREATED DEMAND ASSUMPTIONS**
  - Flood irrigation for non-agricultural purposes (PHOENIX, PINAL)
  - Maintain historical pattern (generally constant, or long-term average)
  - Historical average supply portfolio



INDUSTRIAL DEMAND

- Inside AMAs, Industrial is what the USGS considers "Self-Supplied" – not provided water by a municipal water provider but has their own well/source of water supply
- What's there now, and what's likely to come = research

INDUSTRIAL DEMAND

- **How much water is used per unit, and how many units will there be?**
  - Dairy = number of cows
  - Power plants
    - Operation cycle
    - Megawatts
    - Type
      - ❖ Steam electric (not likely)
      - ❖ Combustion turbine
      - ❖ Solar
      - ❖ Other?
    - Where will the power be used?

INDUSTRIAL DEMAND

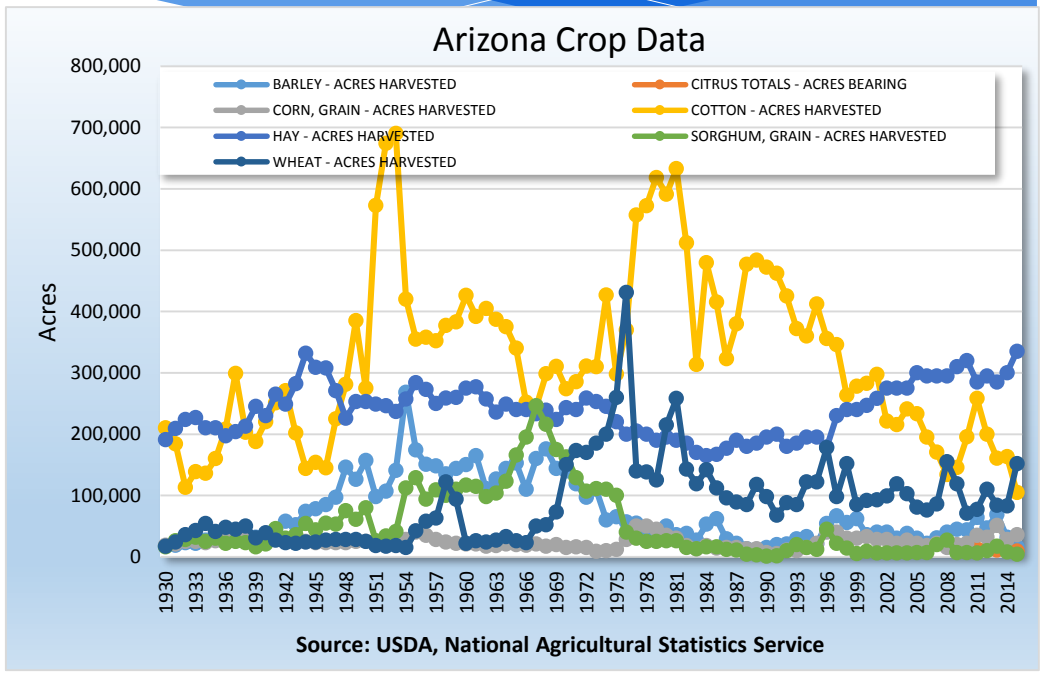
- **How much water is used per unit, and how many units will there be?**
  - Sand and gravel operations
  - Metal mines
  - Feedlots
  - Golf courses and large turf areas (inside AMAs > 10 acres of turf/lake)
  - Other uses
    - Factories
    - Processing plants
    - Nurseries (container grown plants)
    - Other?

4MP GENERAL ASSUMPTIONS

- **INDUSTRIAL ASSUMPTIONS:**
  - Differed by AMA
  - Differed by industrial sub-sector
  - Trend lines, unless other information (new industry start up)
  - Each sub-sector historical supply portfolio (mostly groundwater) unless other information

AGRICULTURAL DEMAND

- Agricultural economy (fluctuations)?
- Cropped vs. fallow?
- Crops grown vs. changes in crop types?
- Double-cropping?
- Irrigation system types/ efficiency?
- Weather patterns?



AGRICULTURAL DEMAND

- **How much can agriculture expand?**
  - Canal system/infrastructure limitations, or not?
  - Depth to water limitations, or not?
  - Other limitations?
    - Cost of power to pump
    - Cost of materials and supplies
    - Economic factors that can be measured

4MP GENERAL ASSUMPTIONS

- **NON-INDIAN AGRICULTURAL ASSUMPTIONS:**
  - Differed by AMA
    - By district
    - IGFRs >10 acres
    - Exempt IGFRs would remain
  - Regulatory/policy limits on water supplies
    - CAP agricultural pool
    - GSF permit limits
  - Infrastructure restrictions
    - Canal capacity
    - Well locations
  - Financial constrictions
    - Ability to drill or deepen wells
    - Electrical costs
  - Review of historical supplies
  - FORECAST

4MP GENERAL ASSUMPTIONS

- **TRIBAL AGRICULTURAL ASSUMPTIONS:**
  - Differed by AMA
  - Information for each community
    - Settlement agreements
    - Other information available (Bureau, leases of water with other entities, etc.)

WATER SUPPLIES

- **Groundwater**
  - Is water quality a concern? How could that affect demand?
  - Is depth to water a concern? How could that affect demand?
- **In-State Non-Colorado River surface water**
- **Colorado River water**

WATER SUPPLIES

- **Reclaimed water (effluent)**
  - Reuse in any sector?
  - Reclaimed systems (non-potable distribution system) deliveries/uses (i.e. turf irrigation at golf courses)?

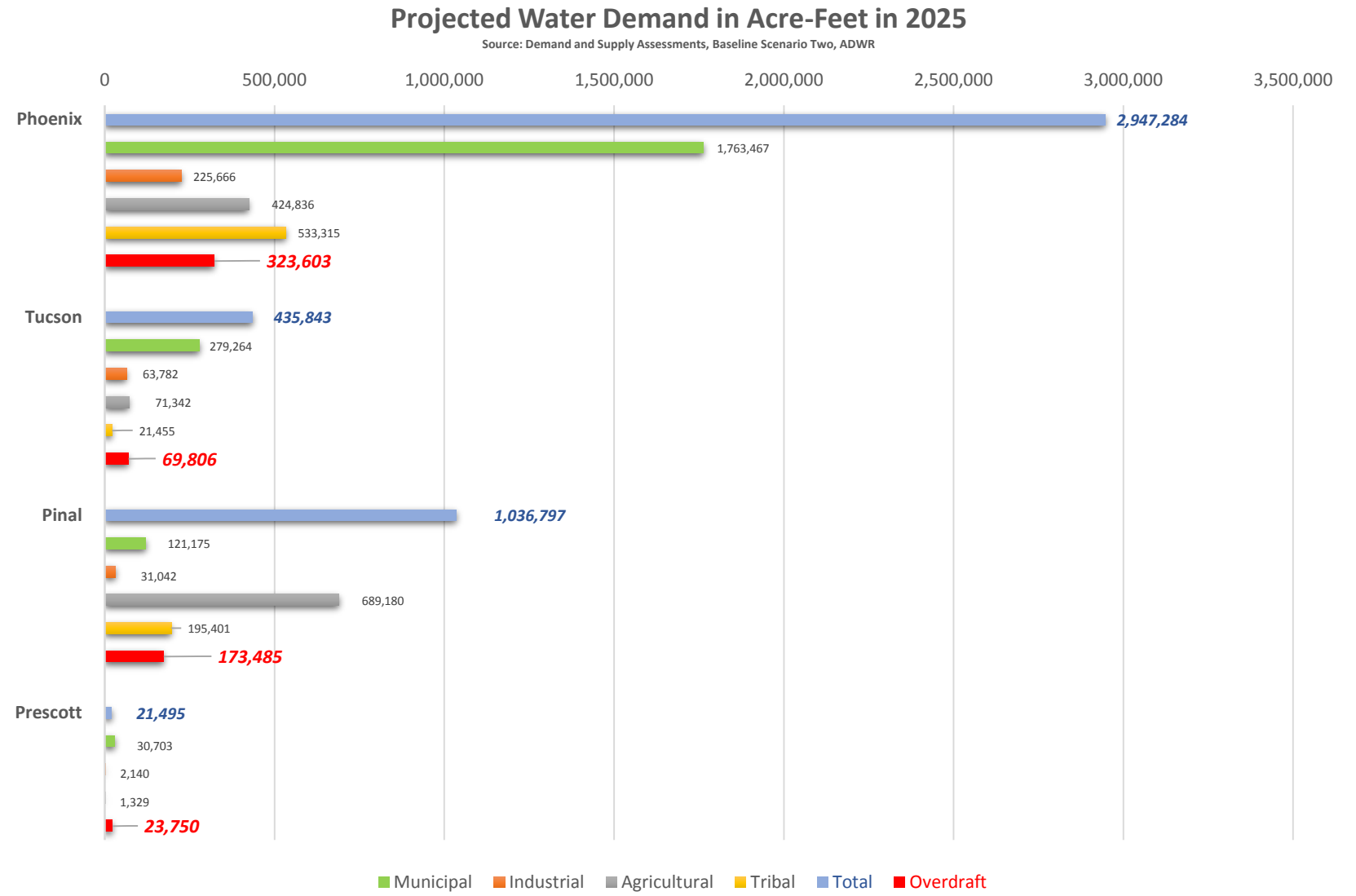
WATER SUPPLIES

- What, if any, are the legal constraints to use of a supply?
- Is water storage an option?
- Is water importation an option?
- Are water exchanges an option?
- How might water supplies change over time?

4MP GENERAL ASSUMPTIONS

- **OTHER ASSUMPTIONS**
  - Availability and distribution of CAP water
  - Long-term storage and GSF of renewable supplies
  - AWBA storage assumptions
  - CAGRD replenishment obligation assumptions
  - Unused CAP assumptions

Impact of Changing Assumptions



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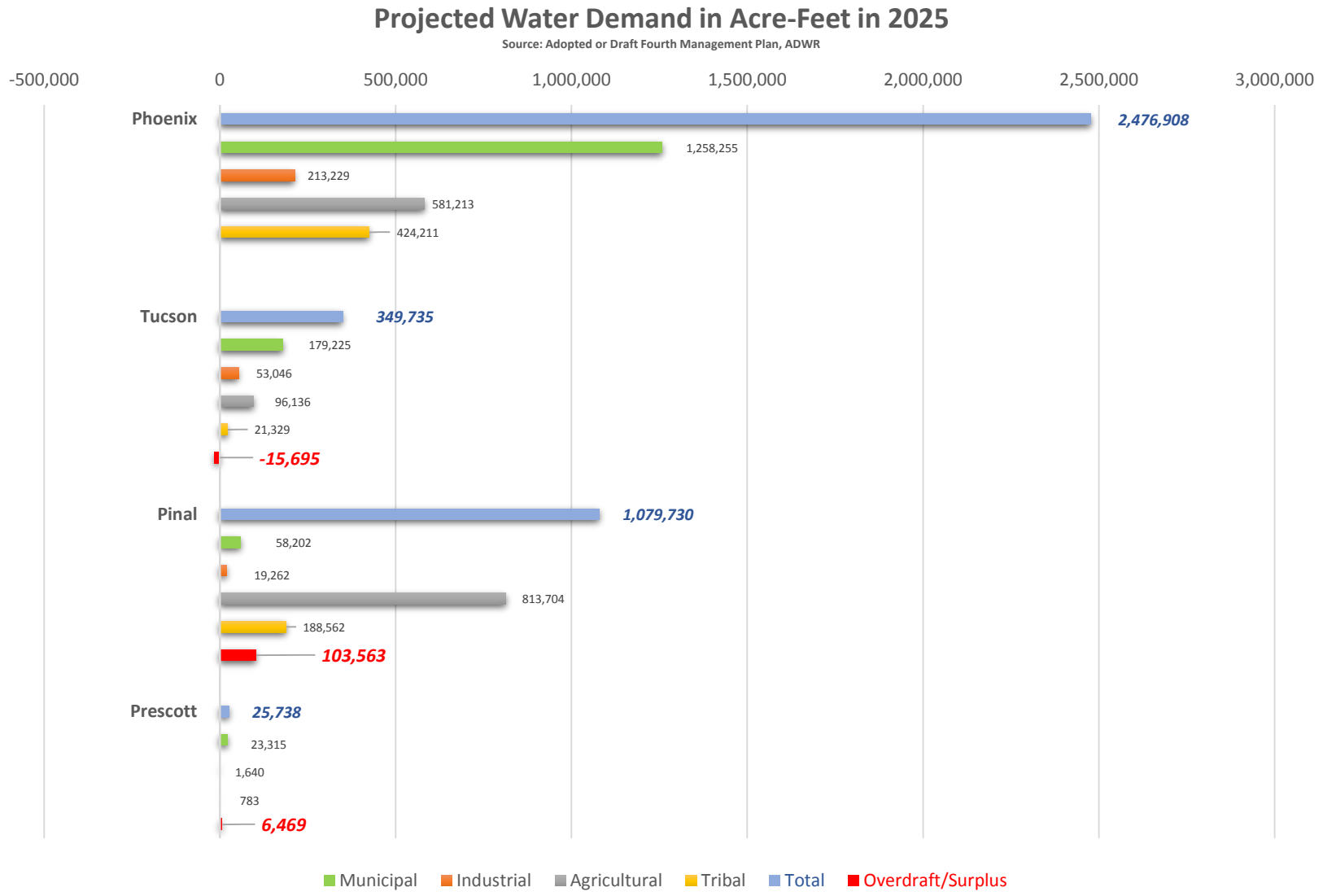


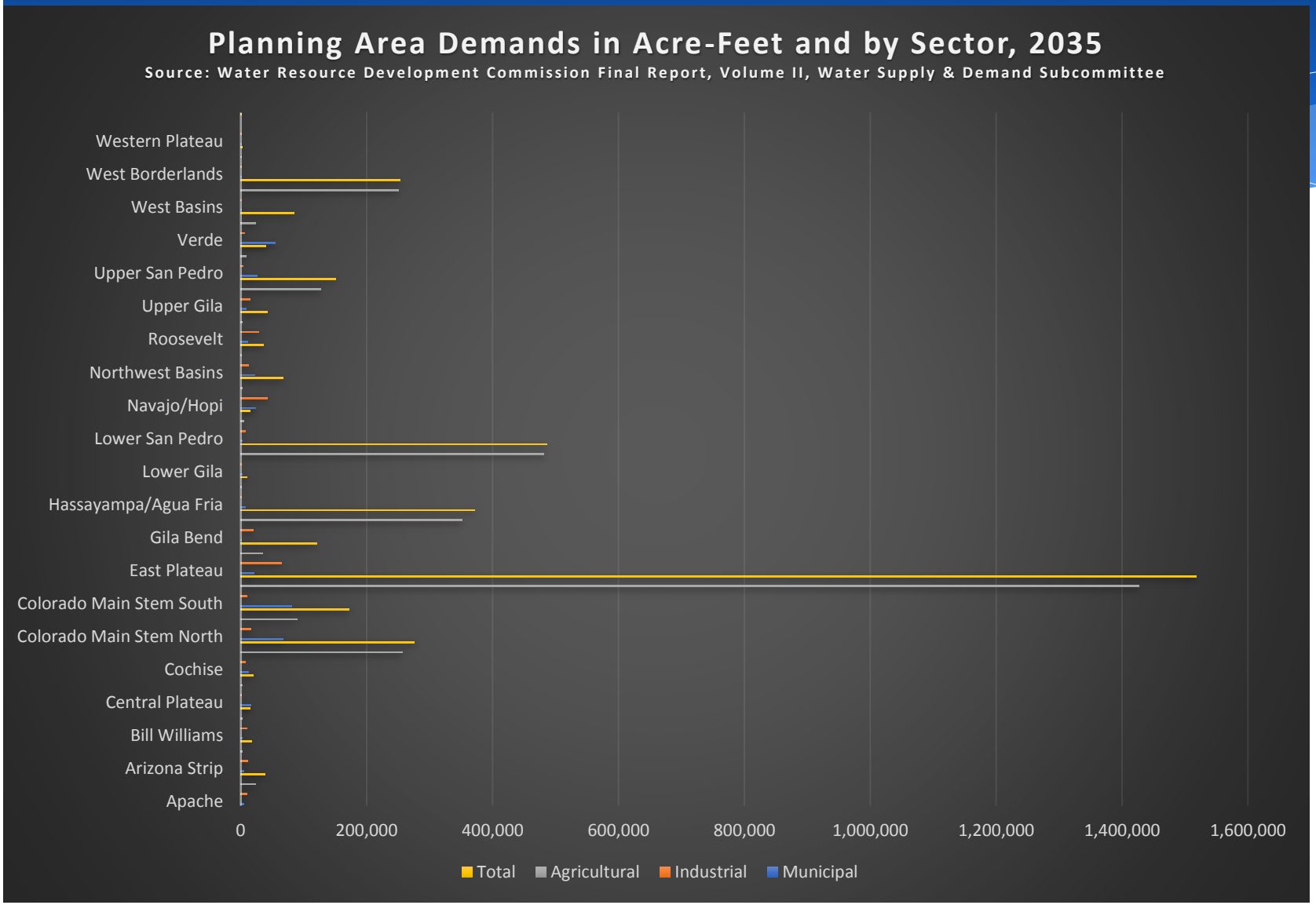
Impact of Changing Assumptions

2035 Projected Water Demand (AF)

Planning Area	WRDC Projection	"Back of the envelope" Projection	Change
Apache	38,214	27,520	(10,694)
Arizona Strip	17,265	3,455	(13,810)
Basin and Range AMAs	4,423,780	3,869,574	(554,206)
Bill Williams	14,807	21,385	6,578
Central Plateau	22,519	13,157	(9,362)
Cochise	276,213	374,638	98,425
Colorado Main Stem North	172,423	132,042	(40,381)
Colorado Main Stem South	1,519,080	1,491,960	(27,120)
East Plateau	125,013	34,653	(90,360)
Gila Bend	377,272	335,644	(41,628)
Hassayampa/Agua Fria	10,322	7,259	(3,063)
Lower Gila	497,669	493,190	(4,479)
Lower San Pedro	14,876	14,830	(46)
Navajo/Hopi	72,027	32,121	(39,906)
Northwest Basins	35,586	38,493	2,907
Roosevelt	42,868	9,438	(33,431)
Upper Gila	151,162	150,513	(649)
Upper San Pedro	39,528	18,446	(21,082)
Verde	84,876	30,184	(54,692)
West Basins	252,576	218,381	(34,195)
West Borderlands	2,048	2,192	144
Western Plateau	1,065	697	(369)
Grand Total	**8,191,189**	**7,319,771**	**(871,418)**

REVISED, 3-8-17

Impact of Changing Assumptions



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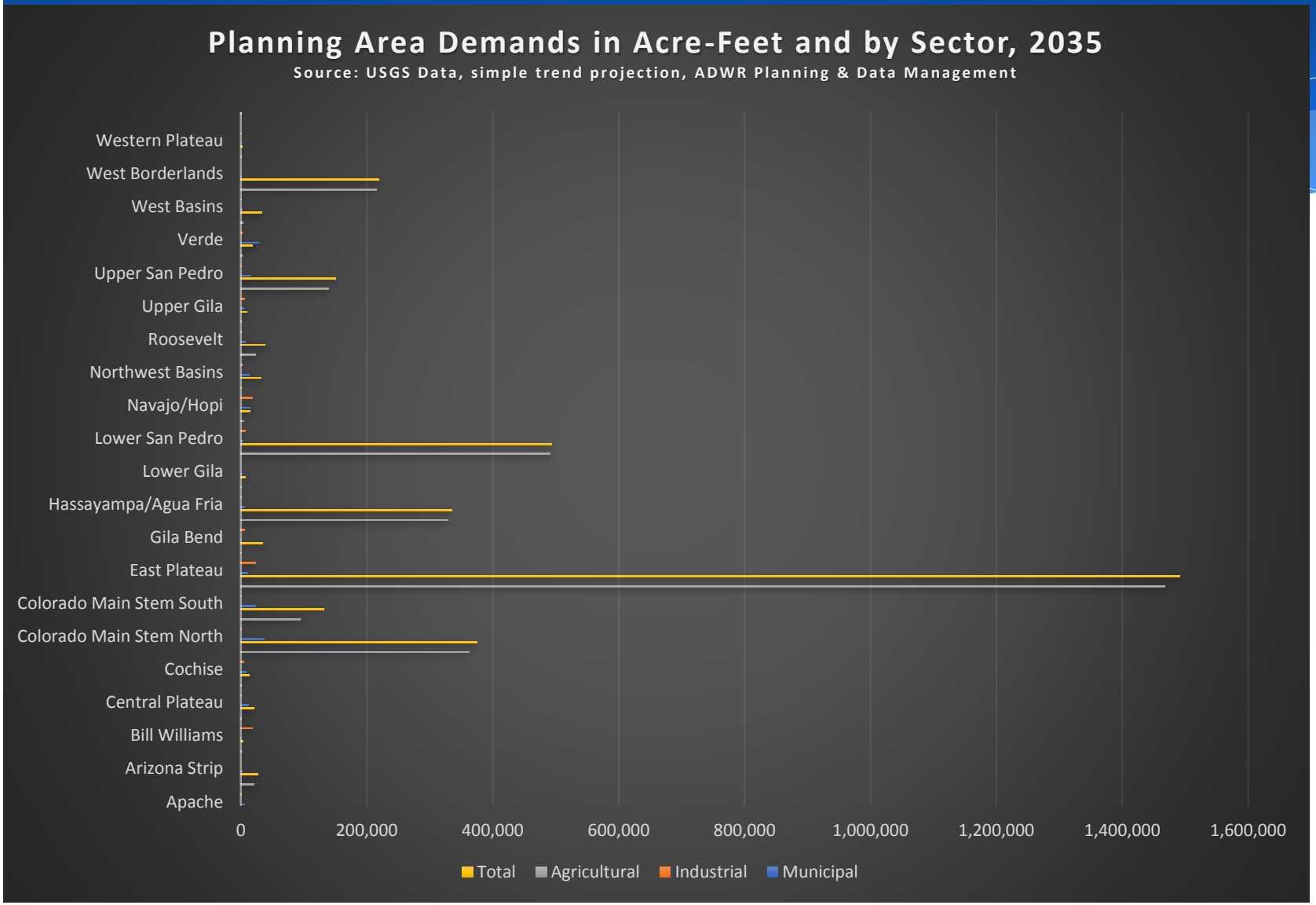

Questions?

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PROTECTING
ARIZONA'S WATER SUPPLIES
for ITS NEXT CENTURY